

COMPUTER SCIENCE 320 (FALL TERM, 2005)  
CONCEPTS OF PROGRAMMING LANGUAGES  
**Problem Set 8: Datatypes and Structures**



OUT: MARCH 26, 2006

DUE: 4:59 PM ON FRIDAY, MARCH 31, 2006

*There are 6 problems in this set, each worth as marked, for a total of 100 points. The harder problems are marked with a single \* (average difficulty) or two \*\* (higher-than-average difficulty). For the easy points, start with the unmarked problems.*

Throughout this assignment, use the datatype declaration for binary trees given at the beginning of Section 4.10 of [P], on page 142. (This datatype declaration is really identical to that at the end of Handout 24, except for minor cosmetic changes.) Before solving the problems below, you may want to write the code of the functions `size`, `depth`, `comptree` and `reflect`, on pages 143 and 144, and experiment with them.

**Problem 1** (15 points) Exercise 4.14, on page 144, in [P].

\* **Problem 2** (15 points) Exercise 4.15, on page 144, in [P].

**Problem 3** (15 points) Exercise 4.16, on page 144, in [P].

**Problem 4** (15 points) Exercise 4.17, on page 145, in [P].

**Problem 5** (15 points) Exercise 4.18, on page 145, in [P]. Declare the desired datatype as `'a extendedTree`.

\*\* **Problem 6** (25 points) Exercise 4.25, on page 154, in [P]. Take advantage of the fact that a dictionary is now an *ordered* list, ordered by the keys; for example, your function `lookup` should find a key in the dictionary using a *binary search* strategy.